

## GOVERNMENT OF INDIA.

## REVENUE AND AGRICULTURAL DEPARTMENT.

## WEATHER SUMMARY FOR DECEMBER 1887.

The average barometric distribution in December is similar in most respects to that of November, and consists briefly of an area of high readings overlying North-Western India, from which pressure decreases and reaches a relatively low level over the south of the Bay and along the south-west coast. About the close of the month it is usual for the high-pressure area in North-West to show signs of instability, and it may sometimes altogether disappear and be replaced by a depression which has either formed in, or advanced over the Punjab. Such a change in the pressure distribution is accompanied by a cyclonic circulation of the winds over a large part of India, and by very unsettled weather, but ordinarily the winds during this month exhibit an anticyclonic circulation, the weather is fine, and the sky, at least in Upper India, quite clear or cloud. During the past December the barometer has been steadily and the weather finer than usual, and though at the close of the month a depression appeared in the Punjab it proved to be so slight as to exercise but little effect either on the general pressure distribution or circulation of the winds.

On December 1st a large area of high pressure extended over the greater part of North-Western and Central India, while the lowest pressures were reported from Ceylon. This distribution was accompanied by north-westerly and westerly winds down the Gangetic plain; northerly winds over Bengal and a large part of the Bay, and easterly winds (N. E. and S. E.) over the Peninsula. The weather was fine throughout nearly the whole country, and the only rain-fall recorded was a slight shower at Galle. These conditions continued with but slight modifications until the 5th, when unsettled weather appeared on the Coromandel Coast, where the wind had "backed" to the north-westward and rain commenced. On the 6th a slight disturbance was shown off Negapatnam and rain was falling at Rangoon, Madras and Coimbatore. In Sind also slightly deficient pressures were shown and the wind had a cyclonic tendency. On the 7th the depression off the Carnatic coast had disappeared as a distinct disturbance, but it had left the weather in Southern India in an unsettled state, and rather heavy rain had fallen both at Negapatnam and Madras. In Sind there was no change. On the 8th rain was still falling all over Southern India, the largest amount being 3½ inches at Madras. In Sind the barometer had risen and the depression almost disappeared. From the 9th to the 14th rain continued to be reported from the south of the Peninsula and Ceylon, but in other respects conditions were fairly normal, though in the North-West the weather was on some days rather cloudy and on the 12th a few drops of rain fell at Bareilly and Roorkee. On the 15th there was no rain in any part of the Indian region, and normal cold weather conditions prevailed generally. This fine weather lasted until the 18th. On the 20th slight showers of rain fell at Murree, Peshawar and Rawalpindi, and on the 21st rain again commenced in the south of the Peninsula. On the 22nd slight snow fell at Murree and rain at Peshawar, and general rain in the south of the Peninsula and over Ceylon. The rain in North-Western India was unaccompanied by any important change in pressure which remained high over the whole of that region. On the 23rd there was again rain at some north-western stations and also over Southern India, but there was still no change in the relative distribution of pressure. On the 25th the slight precipitation which had occurred in the North-West entirely ceased, but on the Carnatic coast showers were reported, which on the following day, extended to several southern stations. The chart of the 27th showed rain to be falling at nearly all the Madras stations as well as at some places in the Central Provinces also, and on the 28th the weather was unsettled over a large part of Central and Southern India. These unsettled conditions were apparently largely attributable to a diffused depression existing off west coast. On the 29th, notwithstanding that the barometer was falling almost everywhere, the weather, except in the south, improved, but on the 30th it again became very unsettled, and three barometric depressions, occasioning slight rain in their respective neighbourhoods, were shown on the chart. One lay between Mangalore and Kanwar, a second between Surat and Indore and a third between Jeypore and Srisa. During the 30th the disturbance which lay over the south of the Punjab apparently travelled towards the hills on a N. N. E. course, occasioning rain at Meerut, Roorkee, Delhi and Ludhiana and snow at Ranikhet, Mussooree, Chakrata, and Simla. By the evening of that day the disturbance had filled up, or disappeared. The chart of the 31st showed that the disturbance between Surat and Indore had also filled up after giving rain to Jhansi, Nowgong, Satna, Pachmarhi, Hosangabad, Indore, and Akola, but that the storm on the west coast had advanced northward to Ratnagiri and was giving rain and fairly strong winds to the North Konkan.

**Pressure.**—The variations of pressure from the mean exhibit no very large abnormalities. With the exception of Hyderabad (Sind) and Galle, they are everywhere less than 0.05". In Assam the mean of the month shows hardly any departure from the normal average, but in nearly all other Northern India, as well as at the great majority of the more central stations, there is a moderate deficiency. In the Peninsula, on the contrary, and at the stations in Sind, Guzerat and Rajputana, the deficiency. There was hence an abnormally steep gradient for easterly winds during the month.



**Temperature.**—The variations of temperature from the monthly mean have been somewhat irregular. In Eastern and Lower Bengal there has been a slight deficiency and in Assam and West Bengal a slight excess. On the plains of the North-Western Provinces and the Punjab the weather has been from 1° to 3° warmer than usual, while on the hills, on the contrary, it has been colder. In Ceylon, Malabar, and the Carnatic the mean temperature shows a deficiency of from 1° to 2°; but in the Circars, the central parts of the country, Rajputana, Guzerat, Sind and Bombay, there is an excess of about an equal amount. In the Punjab, from 26th to the end of the month, low night temperatures were experienced. On the 26th at Rawalpindi the minimum thermometer fell to 28°-9.

**Humidity.**—The air has been relatively dry, except in the south of the Peninsula.

**Rain.**—No rain has fallen during the month in Behar, North Bengal, Assam, Lower Bengal or Sind, and the amounts received in the other districts are, in the majority of cases, insignificant. Guzerat however, received considerably more than its average amount, and Mysore and the Carnatic had about twice as much as usual. In Ceylon about 25 per cent, more than the normal amount fell.

The following table shows the amount of rain and the difference from the average, during the month of December, 1887, according to districts, as far as is indicated by the telegraphic reports:—

Districts.	Number of Stations.	Average rainfall in December.	Difference from the average in December 1887.
Punjab, West	7	0.60	-0.42
" East	4	0.66	-0.7
North-Western Provinces, Trans-Gangetic	9	0.55	-0.37
" " Cis-Gangetic	3	0.23	-0.16
Behar	2	0.19	-0.9
Northern Bengal	2	0.20	-0.20
Assam—Cachar	3	0.49	-0.49
Lower Bengal—Churia Nagpur	7	0.29	-0.29
Orissa—Northern Circars	6	1.03	-1.06
Central Provinces, South	7	0.52	-0.18
Berar—Khandesh	2	0.70	-0.32
Rajputana, Central India, Sagar, and Nerbudda	8	0.37	-0.25
Sind—Dutch	8*	0.10	-0.10
Guzerat	3	2.05	+0.62
Konkat	4	0.35	-0.28
Deccan—Hyderabad	5	0.28	-0.23
Malabar	4	0.82	-0.21
Mysore—Bellary	4	1.50	+1.65
Carnatic	6	3.76	+3.26
Lower Burma	6	0.41	-0.46
Ceylon	2	6.52	+1.38

Sindia January 1888.

#### WEATHER SUMMARY FOR JANUARY 1888.

January is normally an unsettled month over Northern India. The high-pressure area which during November and December is a quasi-permanent feature in the pressure distribution of North-Western India, gives way frequently during January and is replaced by well-marked depressions which occasion clearly defined cyclonic winds, and often much rain and snow. The characteristics of these cyclonic vortices differ apparently according to the place of their origin. Those depressions which first show themselves over the north-west of the Punjab, though usually more or less deep, are ordinarily short-lived, and while occasioning unsettled weather over the Punjab and the west of the North-Western Provinces, both on the hills and plains, quickly fill up, so that their effects are limited almost entirely to the region over which they first make their appearance. These depressions, on the contrary, which are first shown to the south of the Sulman range, and which are usually heralded by a brisk barometric fall all over Sind, Beluchistan and the Indus valley, are, though much shallower than those noticed above, much longer-lived and frequently traverse large tracts of country, travelling generally on an east-south-east course. Of these two classes of storms the past month has afforded one or two typical cases.

In addition to these storms, which are more or less characteristic of the season, the west coast has been visited by very unsettled weather occasioned by the passage northward of a series of disturbances travelling from the Malabar coast as far as the North Konkan or Guzerat coasts.

On the 1st, pressure was high all over Northern India and low on the Bombay coast. The wind circulation was fairly normal, though in the North Konkan the direction was not what is usually the case. Rain was falling in Khandesh, in the south of the Peninsula. From this date until the 6th the principal feature in the weather was the passage north



pression along the west coast. This disturbance gave very unsettled weather to all the Bombay stations and to many in the Central Provinces. On the 4th and 5th the wind at Bombay had an average velocity of 17 miles per hour from north-east, and rainfalls varying from 3·5 inch to 2·7 inches were reported from the western and central stations. On the 6th the barometer was rising almost everywhere and the general distribution approximating to the normal, though the depression previously reported from the west coast had left steep barometric gradients and rather cloudy and unsettled weather to Western and Central India. From the 7th to the 10th the weather over India calls for little remark. Pressure was throughout high over North-Western India, and relatively low over Burma, Ceylon, and the west coast. The wind circulation was fairly normal and the weather was fine. On the 11th a small depression appeared in Lower Sind, occasioning a south-westerly wind at Karachi and Hyderabad and a north-north-easterly wind at Jacobabad, and rain at Quetta and Karachi. On the following day the storm from Lower Sind lay between Indore and Deesa and rain had spread to Mooltan and the north-west of the Punjab. The barometer was rising fast in the Indus valley and falling briskly in the central parts of the country. From the 13th to 19th there again occurred a period during which the barometric distribution was fairly normal, the wind circulation on the whole regular, and the weather generally fine, though on the 16th, 17th, and 18th slight rain fell over Rajputana, the North-Western and Central Provinces, and at some stations in the North-West Himalaya. On the 20th the first sign of an extensive change showed itself. On this day a rapid barometric fall took place at Quetta and in the Indus valley, and a large low-pressure area appeared on the western frontier, the centre of disturbance lying apparently to the south of Quetta and west of Jacobabad. Cyclonic winds were reported from Sind and parts of Rajputana and the Punjab. On the 21st a large diffused depression was shown over Sind, Guzerat, Central India, and the south of Rajputana, and south-easterly winds had appeared over nearly the whole of the North-West and Northern India and a northerly wind at Hyderabad (Sind). Rain was falling at Rawalpindi, Peshawar and Mooltan and snow at Murree. On the 22nd the depression had become much more clearly marked and somewhat deeper, and had its centre near Jeypar. Rather strong cyclonic winds circulated around the centre and rain had extended to most parts of the Punjab, as well as to Jhansi, Satna and Mount Abu. Snow was falling at Morce and Simla. By the morning of the 23rd the depression had reached Seoni and almost filled up. Its movement eastward had, however, been accompanied by an extension in the same direction of the rain-fall area, and rain on this day was reported from nearly all stations in Northern and Central India, from Bengal to the Indus. The rain at Rawalpindi, Sialkot and Gya and the melted snow on the hills of the North-West Himalaya exceeded 1 inch. On the 24th the depression lay between Raipur and Gopalpur. Rain still fell in Bengal but in Northern and North-Western India there had been considerable improvement in the weather. On the morning of the 25th a fresh depression was shown over Guzerat, and rain was falling over the whole of the Indus valley and the Punjab, and snow on the hills of the North-West Himalaya. This depression subsequently travelled east-south-eastward to the Central Provinces and developed very considerably. It occasioned a return of south-easterly winds and rain to the North-Western Provinces and gave north-westerly winds and rain to Rajputana and Guzerat.

At the same time, a local depression had appeared in the north-west of the Punjab, occasioning general rain and snow in its neighbourhood. About 3 feet of snow fell at Mussooree and Simla. By the morning of the 27th the Punjab depression had disappeared, while the Central Provinces depression had continued to travel south-eastward and lay near Gopalpur. Rain was reported from the whole of Bengal and the North-Western Provinces, but had ceased over the greater part of the Punjab and Rajputana. On the 28th the depression was crossing the Bay of Bengal and rain was still falling in Assam and around the head of the Bay, but in other parts of India the distribution of pressure and the circulation of the winds had become fairly normal, and except at a few places the weather had been fine. On the 29th the depression last seen near Gopalpur reappeared near Akyah, and rain was falling over Burma and Assam. In most other parts of India conditions appeared fairly quiet, but in Lower Sind rain and a falling barometer were reported. On the 31st a well-marked disturbance lay to the west of Rajkot, and strong easterly winds and rain were reported from Lower Sind. Elsewhere the weather called for no remark.

**Pressure.**—The mean pressure of the month has been above the average except at the hill stations where, alike at Darjeeling and on the North-West Himalaya, there has been a slight deficiency. The excess was greatest over the Peninsula and Ceylon, and least in Burma and the Punjab.

**Temperature.**—Except in Ceylon, the Circars, and part of Burma, the month has been cold almost everywhere. In Northern India the deficiency ranged from 1° to 5°; in the central parts of the country from 2° to 7°; in Rajputana from 4° to 6°; and in the Peninsula from 1° to 3°. On the hills between the 25th and the close of the month, sharp frost was experienced, the lowest temperature recorded being 21°·1 at Simla on the morning of the 27th.

**Humidity.**—Has been generally below the mean in Northern, and above it in Central and Southern India.

**Rain.**—Has fallen in all the Provinces, and the total amount has been slightly to largely in excess of the average, except in Malabar, Mysore, the Carnatic, Ceylon, and North Bengal. The greatest excess, by far, and relatively, is reported from the Konkan coast.



This wet month has done much to obliterate the seasonal deficiency which has hitherto existed over Northern India, and, at several stations in Bengal and the North-Western Provinces, and at a few in the Panjab, the total rain-fall since November 1st is now in excess of the average. In Central and Western India there is a large excess.

The following table shows the amount of rain and the difference from the average, during the month of January, 1888, according to districts, as far as is indicated by the telegraphic reports:—

Districts.	No. of Stations.	Average rain-fall in January.	Difference from the average in January 1888.
Punjab, West .. .. .	7	1.39	+ 0.52
" East .. .. .	4	1.53	+ 0.20
North-Western Provinces, Trans-Gangetic .. .. .	9	1.47	+ 0.55
" " Cis- .. .. .	3	0.62	+ 0.20
Behar .. .. .	2	0.69	+ 1.52
Northern Bengal .. .. .	2	0.60	- 0.10
Assam, Cachar .. .. .	3	0.71	+ 0.55
Lower Bengal, Chutia Nagpore .. .. .	7	0.43	+ 0.70
Orissa, Northern Circars .. .. .	6	0.50	+ 0.49
Central Provinces, South .. .. .	7	0.50	+ 0.66
Deccan, Khandaesh .. .. .	2	0.47	+ 0.99
Rajputana, Central India, Saugor, and Nerbudda .. .. .	8	0.43	+ 0.42
Sind, Cutch .. .. .	3	0.37	+ 1.27
Guzerat .. .. .	3	0.06	+ 0.42
Konkan .. .. .	4	0.09	+ 2.12
Deccan, Hyderabad .. .. .	5	0.13	+ 0.45
Malabar .. .. .	4	0.37	- 0.15
Mysore, Bellary .. .. .	4	0.35	- 0.13
Carnatic .. .. .	6	0.70	- 0.33
Lower Burma .. .. .	6	0.12	- 0.07
Ceylon .. .. .	2	3.73	- 2.09

SMITH,  
10th February, 1888.

W. L. DALLAS,  
for Offg. Meteorological Reporter to the Govt. of India.